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10/736,834	12/17/2003	Jochen Barth	P24648	5437
7055	7590	12/14/2007	EXAMINER	
GREENBLUM & BERNSTEIN, P.L.C.			MACKOWEY, ANTHONY M	
1950 ROLAND CLARKE PLACE			ART UNIT	PAPER NUMBER
RESTON, VA 20191			2624	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)
	10/736,834	BARTH ET AL.
	Examiner Anthony Mackowey	Art Unit 2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on ____.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-23 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
 5) Claim(s) ____ is/are allowed.
 6) Claim(s) 1-23 is/are rejected.
 7) Claim(s) ____ is/are objected to.
 8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 17 December 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. ____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. ____.
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>3/31/04; 8/17/04</u> .	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: ____.

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters “1, 2, and 3” have been used to designate both the individual images and the camera, optical deflection elements and projection apparatus respectively. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

If additional reference characters are included in the changed drawings, amendment to the specification to add the reference character(s) in the description corresponding to changes in the drawings in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:

- (1) if a machine or apparatus, its organization and operation;
- (2) if an article, its method of making;
- (3) if a chemical compound, its identity and use;
- (4) if a mixture, its ingredients;
- (5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it recites, "[t]he instant abstract is neither intended to define the invention disclosed in this specification nor intended to limit the scope of the invention in any way." This recitation is not a concise statement of the invention and should not be included in an abstract. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities:

Page 9, paragraph 30 recites, "[c]hanges may be made, within the purview of the appended claims, as presently stated and as amended, without departing from the scope and spirit of the present invention in its aspects." Such a recitation is improper because it is directed to possible amendments to the claims throughout prosecution which would become confusing in a patent publication if the application were eventually allowed and published.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8, 13-18, 20, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,639,625 to Ishida et al. (hereafter referred to as "Ishida") in view of "Risley Prism Scan Patterns by Marshall (cited in Applicant's IDS).

Regarding claim 1, Ishida discloses a method of enlarging an image field of a camera by combining partial images (Figs. 1, 5b, 6 and 9a; col. 8, line 4 - col. 11, line 13), the method comprising:

forming a scan pattern, the scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes and to a number of partial images (Figs. 1, 5b, 6 and 9a; col. 8, lines 21-49; col. 9, lines 26-53; col. 10, lines 22-50).

Ishida teaches the scan pattern is obtained by controlling X-axis and Y-axis drive mechanisms to shift the optical axis of the image sensing unit (col. 6, lines 34-47) or with a fixed image sensing unit and a gimbaled mirror (col. 12, lines 18-40). Ishida does not disclose continuously rotating at least two refractive prisms to form a cycloidal scan pattern and therefore is silent with regard to the cycloidal scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes of the cycloidal scan pattern and to a number of partial images. Marshall teaches an optical scanning system including two wedge shaped prisms which continuously rotated to form a cycloidal scan pattern, the scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes of the cycloidal scan pattern (page 74, Abstract and Introduction; pages 82-84).

Both Ishida and Marshall disclose techniques to for scanning patterns. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute

the drive mechanisms or gimbaled mirror taught by Ishida with the rotating prisms taught by Marshall, thereby forming a cycloidal scan pattern, the cycloidal scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes of the cycloidal scan pattern and to a number of partial images. This substitution would predictable result in an imaging device capable of capturing partial images while permitting the image sensing element (CCD) and associated components to remain fixed without the need for control and coordination of a multiple-axis gimbaled system.

Regarding claim 2, Marshall further discloses the cycloidal pattern is an astroid pattern with a plurality of vertexes (page 84, right uppermost subfigure with $M = -3$, $N = 1$, $k = -0.33$).

Regarding claim 3, Ishida further discloses the camera is a focal plane array camera (col. 6, lines 8-19).

Regarding claim 4, Ishida further discloses the image field comprises N pixels and the partial images comprise n pixels (Figs. 5b, 6 and 9a, col. 6, lines 8-10, col. 7, lines 55-64; col. 8, line 50 – col. 9, line 25; col. 9, lines 54-65; col. 10, lines 35-50, *images captured by the CCD array are combined to form larger combined images*).

Regarding claim 6, Ishida captures four images at the vertexes of the square scan pattern (Figs. 1, 5b, 6 and 9a; col. 8, lines 35-47; col. 8, lines 40-46; col. 10, lines 35-45). One of ordinary skill in the art at the time the invention was made would have clearly recognized an

astroid scan pattern approximates a square scan pattern as it has four vertexes. Therefore, it would have been obvious to one of ordinary skill in the art to capture the images at the vertexes of the astroid scan pattern in the combination of the teachings of Ishida and Marshall presented above analogously to capturing the images at the vertex of the square pattern. Ishida further discloses a finite amount of time is required to capture an image (col. 11, lines 18-20). Marshall discloses the equations for calculating the vector components of the optical deviation (page 75, Section 2.1) and the parameters for forming an astroid scan pattern (page 85, upper rightmost subfigure). When these parameters are substituted into these equations, the equations taught by Marshall are equivalent to the equations presented in the specification of the present invention (page 8, lines 1-3), thus reversal of the scan pattern taught by Marshall must also occur substantially in a midpoint of a scanning time. Therefore, in the combination of Ishida and Marshall presented above, if the images are captured over a finite amount of time at vertex of the scan pattern as taught by Ishida and the astroid pattern formed by the rotating prisms as taught by Marshall, the point of reversal would occur substantially in a midpoint of a recording time of the individual images.

Regarding claim 5, as discussed above with regard to claim 6, Ishida discloses a finite amount of time is required to capture an image and the images are captured at the vertexes of the scan pattern in the combination of Ishida and Marshall described above. Thus, in the combination of Ishida and Marshall described above, if the images are captured at vertex of the scan pattern, the reversal of movement at the vertexes of the astroid pattern would occur within the recording time of an individual image and given the time for capturing an image and time

between capturing the images (Ishida, col. 11, lines 17-34), the reversal of movement at the vertexes of the astroid pattern would reduce unsharpness to less than a size of a pixel during a recording time of an individual image.

Regarding claim 7, the combination of Ishida and Marshall discloses:

producing four partial images using the astroid pattern (see arguments presented above for claim 6); and

combining the four partial images (Ishida, Figs. 5b, 6 and 9a, col. 6, lines 8-10, col. 7, lines 55-64; col. 8, line 50 – col. 9, line 25; col. 9, lines 54-65; col. 10, lines 35-50).

Regarding claim 8, Ishida further discloses the combined partial images overlap (Figs. 5b, 6 and 9a, col. 10, lines 44-45).

Regarding claim 13, please see arguments presented above for claims 1, 2 and 7.

Regarding claim 14, please see arguments presented above for claim 6.

Regarding claim 15, please see arguments presented above for claim 5.

Regarding claim 16, please see arguments presented above for claim 6.

Regarding claim 17, please see arguments presented above for claims 6 and 7.

Regarding claim 18, Ishida discloses an apparatus for enlarging an image field of a camera by combining partial images, the apparatus comprising:

an optical element configured to rotate about two axes (Figs 1 and 11; col. 6, lines 6-47; col. 12, lines 18-39); and

a camera that captures a plurality of partial images (Figs 1 and 11; col. 6, lines 6-47; col. 12, lines 18-39),

wherein optical element forms an optical axis that follows a pattern (Figs. 1, 5b, 6 and 9a; col. 8, lines 21-49; col. 9, lines 26-53; col. 10, lines 22-50).

Ishida does not disclose a first optical element configured to rotate about an axis and a second optical element configured to rotate about the axis, wherein the first optical element and second optical element form an optical axis that follows a cycloidal pattern. Marshall teaches an optical scanning system including two wedge shaped prisms which continuously rotated to form a cycloidal scan pattern, the scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes of the cycloidal scan pattern (page 74, Abstract and Introduction; pages 82-84). Regarding the combination of teachings of Ishida and Marshall, arguments analogous to those presented above for claim 1 are applicable to claim 18.

Regarding claim 20, Marshall further discloses the cycloidal pattern is in the form of an astroid pattern. (page 84, right uppermost subfigure with $M = -3$, $N = 1$, $k = -0.33$).

Regarding claim 21, Marshall further discloses the astroid pattern has a plurality of vertexes (page 84, right uppermost subfigure with $M = -3$, $N = 1$, $k = -0.33$).

Regarding claim 23, the combination of Ishida and Marshall further discloses the camera captures each of the plurality of partial images during a time that a center of the optical axis is at the vertex of the pattern (Ishida, Figs. 1, 5b, 6 and 9a; col. 8, lines 35-47; col. 8, lines 40-46; col. 10, lines 35-45; please also see arguments presented above for claim 6).

Claims 9-12, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida and Marshall as applied to claims 4 and 18 above, and further in view of US 2003/0142882 to Beged-Dov et al. (hereafter referred to as “Beged”).

Regarding claim 9, Ishida and Marshall are silent with regard to projecting at least one alignment mark in to a region of overlap of the individual images; measuring a shift between partial images by an image processor; and assembling the partial images based on the measured shift to form a combined image. Beged discloses a method and system for capturing and combining a plurality of images including projecting at least one alignment mark in to a region of overlap of the individual images; measuring a shift between partial images by an image processor; and assembling the partial images based on the measured shift to form a combined image (Figs. 1, 4 and 5; pages 1-3, paragraphs 13-18).

Ishida and Beged are both concerned with capturing a plurality of images and processing them to form a combined image. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Ishida, Marshall and Beged such that the method taught by the combination of Ishida and Marshal could be modified to include projecting at least one alignment mark in to a region of overlap of the individual images;

measuring a shift between partial images by an image processor; and assembling the partial images based on the measured shift to form a combined image as taught by Beged.

This combination would predictably result in improved speed of processing and improved quality of the stitched/combined images compared to stitching/combining without the use of projected alignment targets (Beged, page 1, paragraphs 3 and 12). It has been held that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does not more than yield predictable results.” *KSR.*, 127 S. Ct. at 1739, 82USPQ2d at 1395 (2007) (citing *Graham*, 383 U.S. at 12)

Regarding claim 10, Beged further discloses limiting the projection of the at least one alignment mark to a few scanning cycles (page 2, paragraph 16, the fiducial generator projects the fiducial for a limited time when the images are being captured).

Regarding claim 11, Beged further discloses the projection of the at least one alignment mark is permanent (page 2, paragraph 16, the projection of the fiducial may optionally be left in a constant “on” condition).

Regarding claim 12, Beged further discloses the at least one alignment mark is projected into an edge region of the combined image (Fig. 1).

Regarding claim 19, Ishida and Marshall are silent with regard to an aligner that projects alignment marks. Beged discloses a system including an aligner that projects alignment marks

(Figs. 1 and 2; pages 1-3, paragraphs 13-18). Regarding the combination of the teachings Ishida, Marshall and Beged, arguments analogous to those presented above for claim 9 are applicable to claim 19.

Regarding claim 22, Beged further discloses an image processor that determines the position of the projected alignment marks (Figs. 1 and 2; pages 2 and 3, paragraph 17).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 18 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by US 6,005,682 to Wu. et al. (cited in Applicant's IDS, hereafter referred to as "Wu").

Although the preamble has been addressed in the rejections presented under 35 U.S.C. 103 above, recitation in the preamble need not be given patentable weight. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). In this instance, the limitations recited in the body of the

claims are capable of standing alone and are not limited to enlarging an image field of a camera by combining partial images.

Further the recitation, “to form a cycloidal scan pattern, the cycloidal scan pattern comprising points of reversal of scan movement that corresponds to a number of vertexes of the cycloidal scan pattern and to a number of partial images” in the body of claim 1 is a recitation of intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In the case of Wu, although Wu does not rotate the prisms to form a cycloidal scan pattern having vertexes (Figs. 5 and 6), the two rotating prism system taught by Wu is not structurally different from the two rotating prisms of the present invention, and therefore is capable producing a cycloidal scan pattern having vertexes.

Regarding claim 1, Wu discloses a method comprising continuously rotating at least two refractive prisms to form a cycloidal scan pattern that correspond to a number of partial images (Figs. 2, 5, and 6; col. 3, line 52 – col. 5, line 30).

Regarding claim 18, Wu discloses an apparatus comprising:
a first optical element configured to rotate about an axis (Fig. 2; col. 3, lines 52-64;
a second optical element configured to rotate about the axis (Fig. 2; col. 3, lines 52-64;
and

a camera that captures a plurality of partial images (Figs. 2, 5, and 6; col. 3, line 52 – col. 5, line 30),
wherein the first optical element and second optical element form an optical axis that follows a cycloidal pattern (Figs. 5 and 6).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 1,647,631 to Ives

US 2,975,668 to Eckel

US 3,378,687 to Schepler

US 4,355,904 to Balasubramanian

US 4,414,684 to Blonder

US 4,648,712 to Brenholdt

US 4,675,532 to Carson

US 4,717,823 to Steimel et al.

US 5,528,290 to Saund

US 5,581,637 to Cass et al.

US 5,964,432 to Obkircher

US 6,961,145 to Smith

US 7,016,551 to Abe et al.

US 7,272,253 to Katsuta et al.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Mackowey whose telephone number is (571) 272-7425. The examiner can normally be reached on M-F 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AM
12/7/07



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